

Appendix
Cost Effectiveness of Subsidizing Fruit and Vegetable Purchases
Through the Supplemental Nutrition Assistance Program
Choi, Seligman, and Basu

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TEXT 1. MODEL SIMULATION

We developed a microsimulation model, which simulates food consumption and associated changes to the BMI), Type II diabetes, myocardial infarction (MI), and stroke risk at the level of the individual. The model is stochastic by sampling from probability distributions of input parameters to generate a distribution of outcomes. The model is run in discrete time steps over the life-course from 2015, where the simulated policy changes are introduced at the start of year 2015. A model diagram is illustrated in Figure 1. Key parameters and data sources are summarized in Appendix Tables 7-14.

We classified synthetic population in this model by combinations of a few key demographic characteristics: aged (0-9, 10-19, 20-39, 40-59, 60-85 years old), sex, race/ethnicity (NHANES categories of non-Hispanic white, non-Hispanic black, Mexican-American or other), and income (relative to the FPL, adjusted for household size), and participation or non-participation in SNAP. Because NHANES is repeated cross-sectional, we had to construct synthetic population to account for the weights. 10,000 individuals were generated, per ISPOR guidelines, for each cohort defined by the combinations of these characteristics. The model was re-run 10,000 times while repeatedly Monte Carlo sampling from the probability distributions of all input parameters to capture uncertainties in our estimates.¹

The multiple baseline CVD risk factors and prevalent disease cases were assigned to each simulated individual by repeated Monte Carlo sampling from the probability distributions of each of these variables in NHANES, specific to each demographic group. The joint probability distributions of these risk factors were accounted for using multivariate sampling with copula

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functions, which allow us to capture how these factors are co-dependent. This procedure exclusively takes into account strong correlation between risk factors. To account for individuals aging, we tracked the age of each simulated individual over the simulation period, and updated each individual's food consumption and health metrics to account for their age-specific consumption patterns and health risks by preserving the individual's rank in the population distribution to account for the stability of risk over time and differential survival probability.

TEXT 2. WEIGHT CHANGES ASSOCIATED WITH CALORIC INTAKE

The estimated impact of HIP on total energy intake was small (49 fewer kilocalories per day in the HIP group) and not statistically significant while the daily kilocalories effect size from the HIP trial has the advantage of being randomized among a SNAP population as opposed to prior trials or observational studies.² In our study, daily caloric intake was expected to increase with increases in FV intake.

A starting weight and height were given to each simulated individual by Monte Carlo sampling from NHANES (Appendix Tables 13-14), using the covariance matrix between these variables and the food consumption distributions to guide sampling. After an intervention, change in total calorie consumption was converted into changes in weight over time.

For children, we used a validated NIH model of body mass change among children aged 5 to 18, which accounts for child growth trajectories.³ The net change in kilograms among children given a change in kilocalories per person per day is given by Equation [1] for males and Equation [2] for females:

$$\text{Male: } \Delta \text{kg} = \frac{(\Delta \text{kcal /person /day})}{(68 - 2.5age)} \quad [1]$$

$$\text{Female: } \Delta \text{kg} = \frac{(\Delta \text{kcal /person /day})}{(62 - 2.2age)} \quad [2]$$

For adults, we employed the validated NIH model of individual body weight $M(t)$ change after a change in calorie consumption χ :

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$$\frac{dM(t)}{dt} = [\chi(t) - \kappa(t)(M(t) - M_0)]/\tau \quad [3]$$

where M_0 is initial body weight prior to the calorie consumption change, τ is the weight change associated with net energy consumption, and $k(t)$ captures energy expenditure. Finally, $X(t)$ denotes change in caloric consumption per day.⁴ The internal physiology of metabolism is captured by:

$$\tau = \frac{\eta_f + \rho_f + c\eta_l + c\rho_l}{(1 - d)(1 + c)} \quad [4]$$

$$\kappa(t) = \frac{1}{(1 - d)} \left(\frac{\gamma_f + c\gamma_l}{(1 + c)} + P(t) \right) \quad [5]$$

where Equation [4] captures the efficiency of fat and protein synthesis η_f and η_l , energy content per unit fat and lean tissue ρ_f and ρ_l , relative change in lean mass per change in fat mass c , and adaptive thermogenesis d . Equation [5] describes catabolic energy breakdown given resting metabolic rates of fat and lean tissue γ_f and γ_l and physical activity P . We assumed no change in physical activity resulting from the FV subsidy. Parameter values are as follows^{4,5}:

$\eta_f = 230$: Synthesis efficiency, 230kcal/kg \pm 100

$\eta_l = 180$: Protein synthesis efficiency, 180 kcal/kg \pm 20

$\rho_f = 9400$: Energy content per unit change in body fat, 9400 kcal/kg

$\rho_l = 1800$: Energy content per unit change in lean tissue, 1800 kcal/kg

$c = 0.5$: Relative change in lean mass per change in fat mass

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$d = 0.24$: Adaptive thermogenesis parameter, 0.24 ± 0.1

$\gamma_f = 3.6$: Resting metabolic rate of fat, $3.6 \text{ kcal/kg/day} \pm 4$

$\gamma_l = 22$: Resting metabolic rate of lean tissue, $22 \text{ kcal/kg/day} \pm 4$

TEXT 3. RISK OF MYOCARDIAL INFARCTION (MI) OR STROKE

We used validated equations of monthly risks of MI and stroke estimated by fitting exponential curves to data on age- and sex-specific incidence of first MI and stroke from the Framingham Heart Study (1980-2003), published by the National Heart, Lung, and Blood Institute.^{6,7} We chose to use Framingham equations, and not the newer Pooled Cohort Equations, given recent evidence that the newer equations are over-fitted to limited data and may produce less accurate estimates of current risk than the Framingham equations⁸⁻¹¹; recent comparative analyses actually have found the newer alternatives to offer no significant benefit over the Framingham equations, even when predicting risk among minorities¹²; furthermore, the Framingham equations separately predict coronary heart disease and stroke, which have different implications for mortality and quality of life.¹³ In addition, Framingham functions include diabetes status that the increased relative risk of heart disease and stroke from co-morbid diabetes is captured in our model.

Given no history of MI (x=age in years),

$$\text{Male: } y = 0.0001 * e^{0.0312x} \quad [6]$$

$$\text{Female: } y = 8E - 06 * e^{0.0599x} \quad [7]$$

Given no history of stroke (x=age in years),

$$\text{Male: } y = 9E - 06 * e^{0.0622x} \quad [8]$$

$$\text{Female: } y = 3E - 06 * e^{0.0741x} \quad [9]$$

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Given history of CVD, the risk of MI or stroke without a history of CVD was multiplied by a constant with a mean of 2, SD 1.0204, gamma distribution (shape=3.84166,scale=0.520608).

In order to account for other CVD risk factors, we adopted a previously-published approach in which weights are assigned to each individual based on the following risk factors used in Framingham risk equations,^{14,15} age, total cholesterol, HDL cholesterol, hypertension treatment status, smoking, and diabetes. Individual Framingham risks were divided by the mean Framingham risk of each cohort (defined by age, sex, race, and income), then used to weight each individual's baseline MI and stroke risk equations, Equations [6]-[9].

Framingham risk equations:

For male,

$$\text{Individual_FHS_risk} = (1 - 0.88936) * \exp((3.06117 * \log(\text{age}) + 1.12370 * \log(\text{total_cholesterol}) - 0.93263 * \log(\text{HDL_cholesterol}) + 1.99881 * \log(\text{SBP_treated}) + 1.93303 * \log(\text{SBP_untreated}) + 0.65451 * \text{smoking} + 0.57367 * \text{diabetes}) - 23.9802)$$

For female,

$$\text{Individual_FHS_risk} = (1 - 0.95012) * \exp((2.32888 * \log(\text{age}) + 1.20904 * \log(\text{total_cholesterol}) - 0.70833 * \log(\text{HDL_cholesterol}) + 2.82263 * \log(\text{SBP_treated}) + 2.76157 * \log(\text{SBP_untreated}) + 0.52873 * \text{smoking} + 0.69154 * \text{diabetes}) - 26.1931)$$

$$\text{Weights assigned to individual} = \frac{\text{Individual FHS risk}}{\text{Mean FHS risk of each cohort}}$$

TEXT 4. MORTALITY AFTER MYOCARDIAL INFARCTION (MI) OR STROKE

We used validated equations of age- and sex-specific risk of mortality after MI and stroke developed by fitting exponential curves to the ratio of incidence of fatal event to total incidence of event. Fatal MI and total incidence of MI data was from the Framingham Heart Study. The ratio of fatal stroke to stroke incidence was obtained from the Cardiovascular Health Study.^{6,7}

After MI (x=age in years),

$$\text{Male: } y = 0.0289 * e^{0.0269x}$$

$$\text{Female: } y = 0.0004 * e^{0.0706x}$$

After stroke (x=age in years),

$$\text{Male: } y = 0.0003 * e^{0.0782x}$$

$$\text{Female: } y = 0.0034 * e^{0.0428x}$$

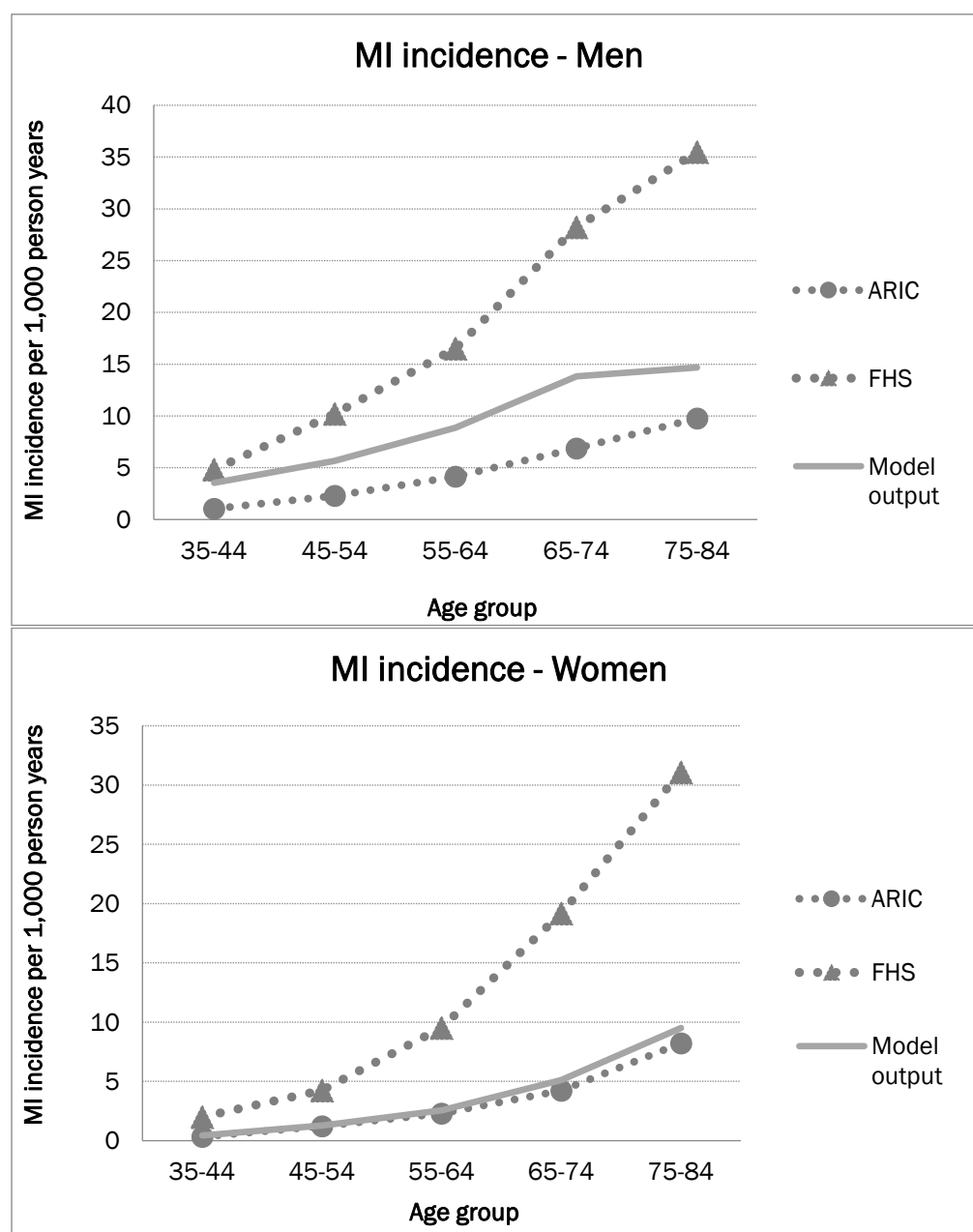
Simulation code available at <https://sdr.stanford.edu/>.

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Appendix Figure 1. MI incidence.

We considered our targets were met if the projected incidence fell within the interval between the estimates from Framingham Heart Study (FHS) and Atherosclerosis Risk in Communities study (ARIC), more-inclusive and less-inclusive measures of composite CVD outcomes.

Note: Our model was validated against independent disease incidence estimates. However, such estimates are not themselves a real population registry, but rather are largely from surveys. Hence, our model cannot be thought of as calibrated or validated retrospectively against a real population. A potential amendment to this problem is prospective validation and further refinement of the model against emerging datasets that will provide some further insights.

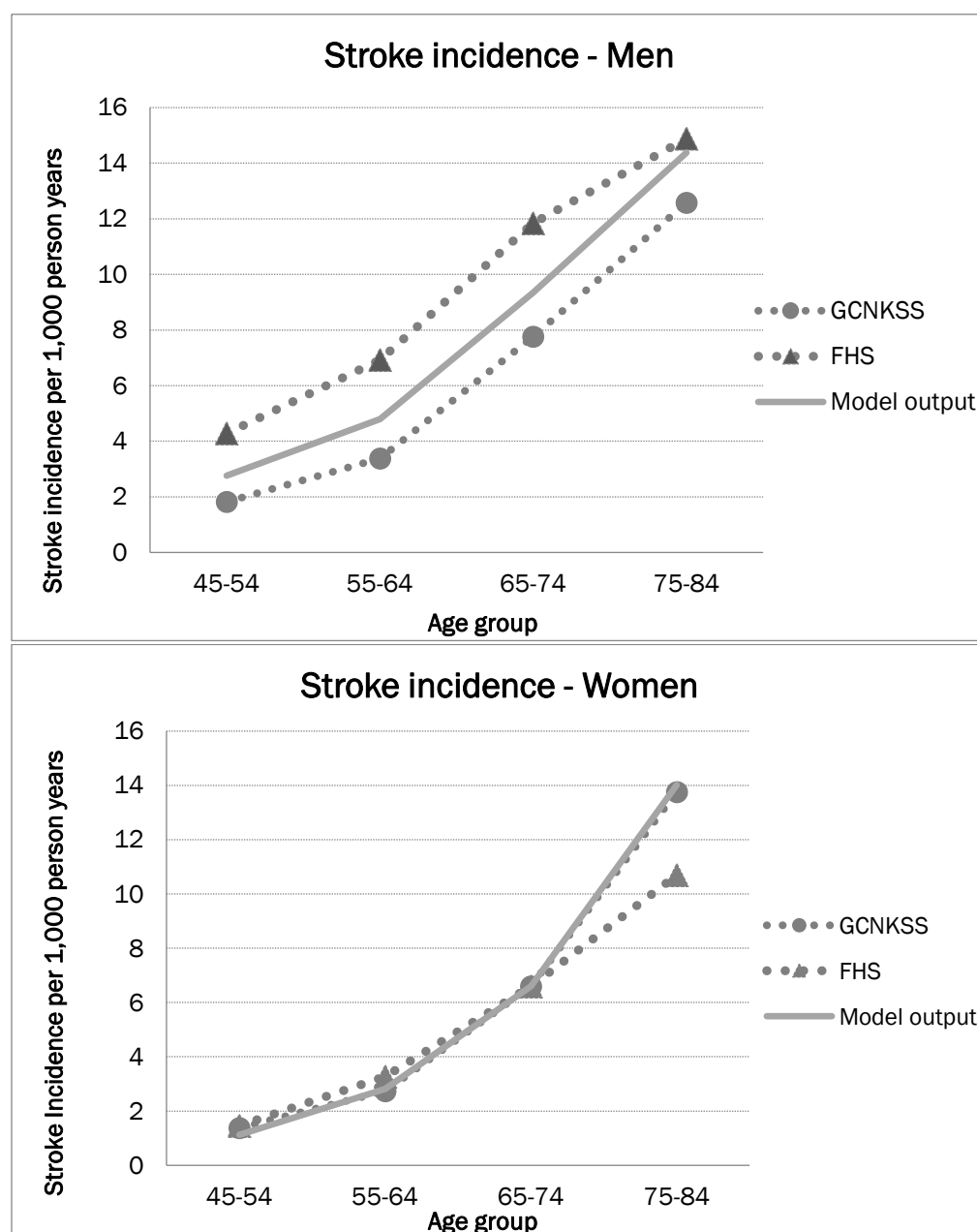


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Appendix Figure 2. Stroke incidence.

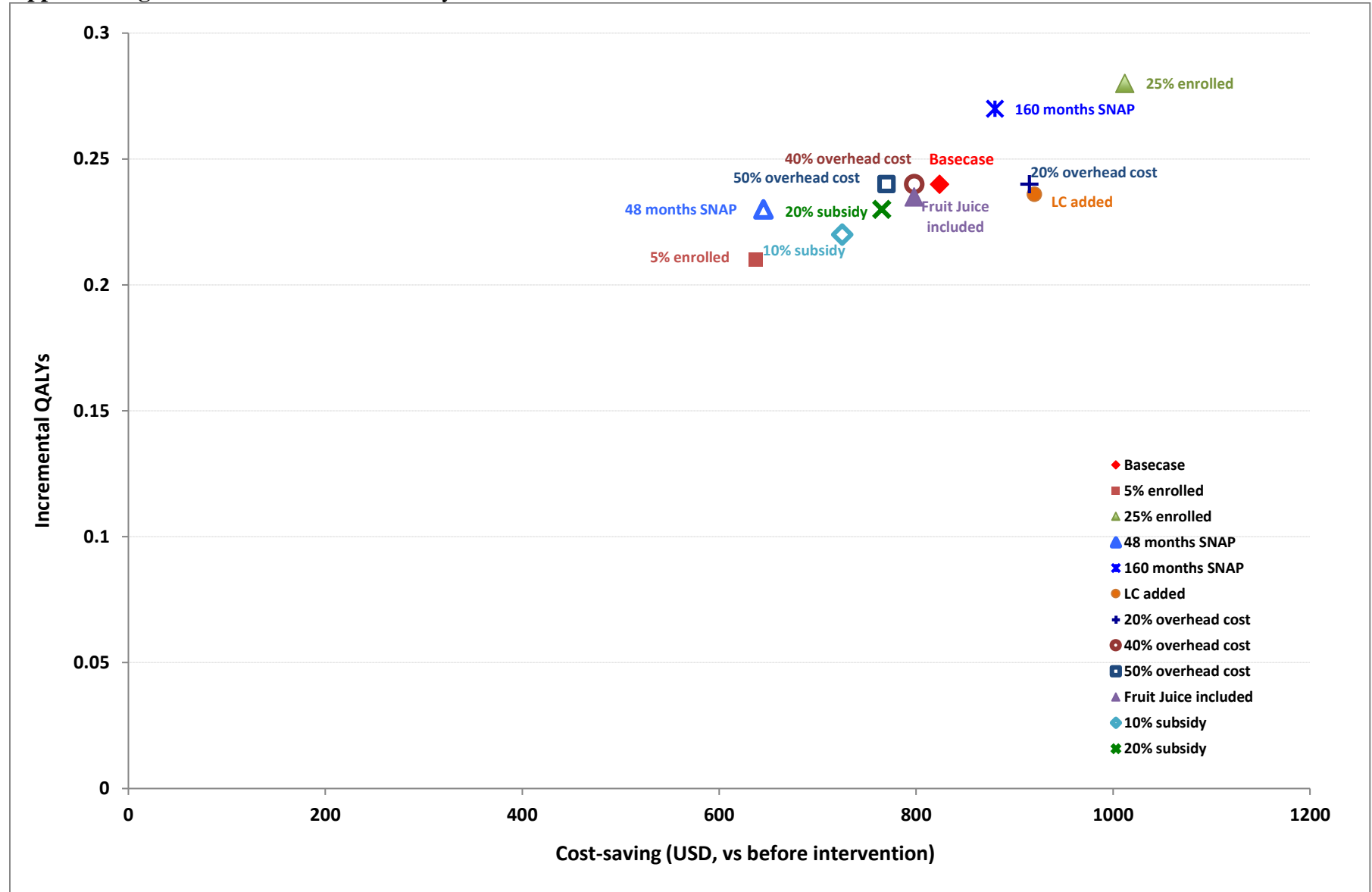
We considered our targets were met if the projected incidence fell within the interval between the estimates from Framingham Heart Study (FHS) and : Greater Cincinnati/Northern Kentucky Stroke Study (GCNKSS).

Note: Our model was validated against independent disease incidence estimates. However, such estimates are not themselves a real population registry, but rather are largely from surveys. Hence, our model cannot be thought of as calibrated or validated retrospectively against a real population. A potential amendment to this problem is prospective validation and further refinement of the model against emerging datasets that will provide some further insights.



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Appendix Figure 3. Cost-effectiveness analysis.

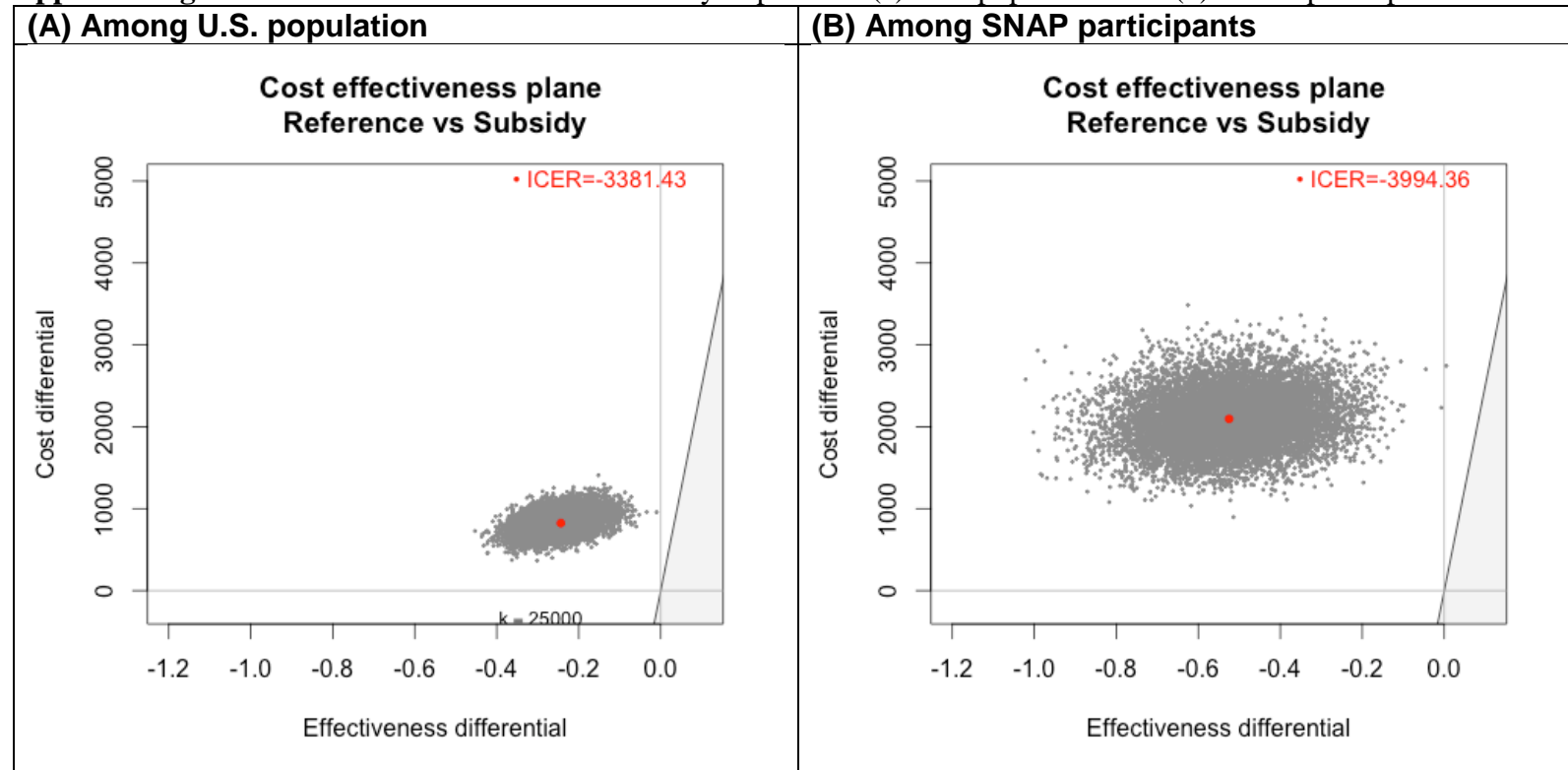


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Notes: 5% enrolled: 5% of the U.S. population enrolled in SNAP; 25% enrolled: 25% of the U.S. population enrolled in SNAP; 48 months SNAP: 48 months completed length of SNAP participation; 160 months SNAP: 160 months completed length of SNAP participation; LC added: lung cancer included as one of the health outcomes; 20% overhead cost: 20% overhead expenditure rate; 40% overhead cost: 40% overhead expenditure rate; 50% overhead cost: 50% overhead expenditure rate; Fruit juice included: 100% fruit juice included in consumption changes in addition to refined grain and targeted FV; 10% subsidy: subsidizing 10% of FV purchases; 20% subsidy: subsidizing 20% of FV purchases

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Appendix Figure 4. Base-case cost-effectiveness analysis plots for (a) U.S. population and (b) SNAP participants

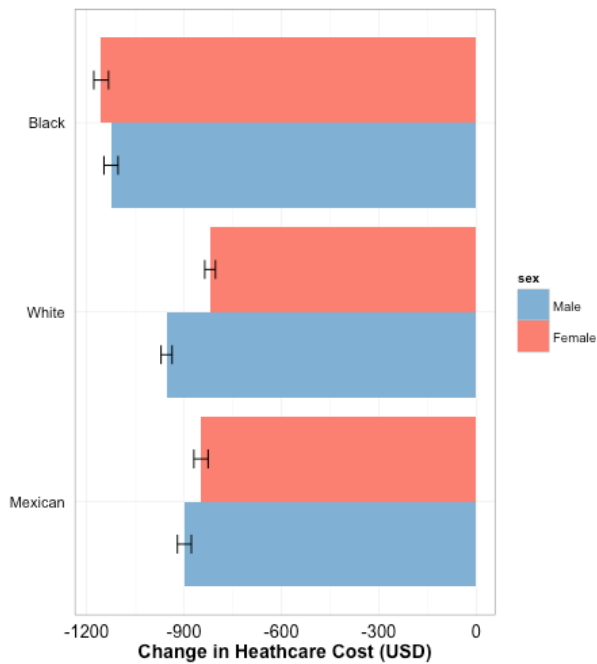


	U.S. population				SNAP population			
	Total cost (USD)	Cost of intervention (USD)	Gains in QALYS	Cost per QALY gained	Total cost (USD)	Cost of intervention (USD)	Gains in QALYs	Cost per QALY gained
Status quo	8,580.21				8,986.66			
30% subsidy	7,756.47	202.49	0.24	-\$3,381	6,890.59	1,324.40	0.52	-\$3,994

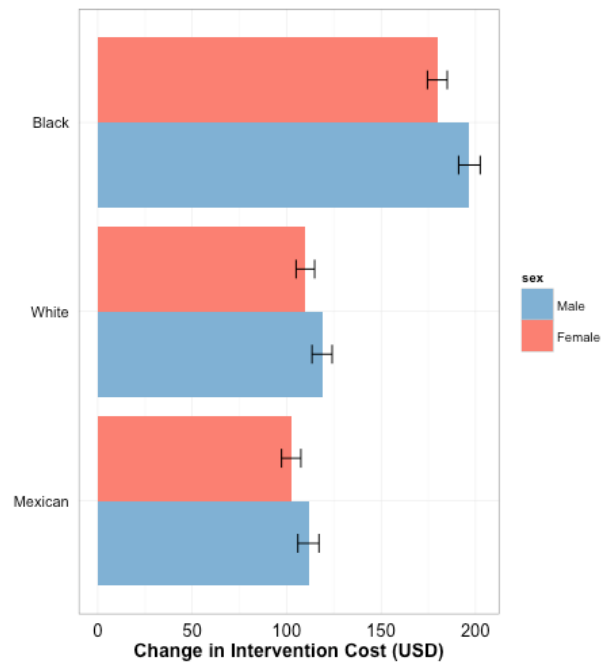
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Appendix Figure 5. Projected changes in QALYs and costs associated with disease conditions after 30% FV subsidy.

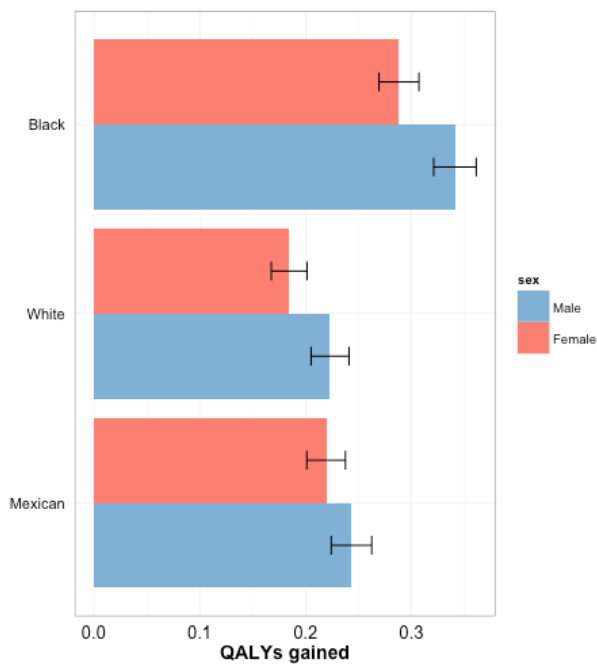
(A) Change in healthcare cost after subsidy



(B) Intervention cost (implementation and incentive costs)



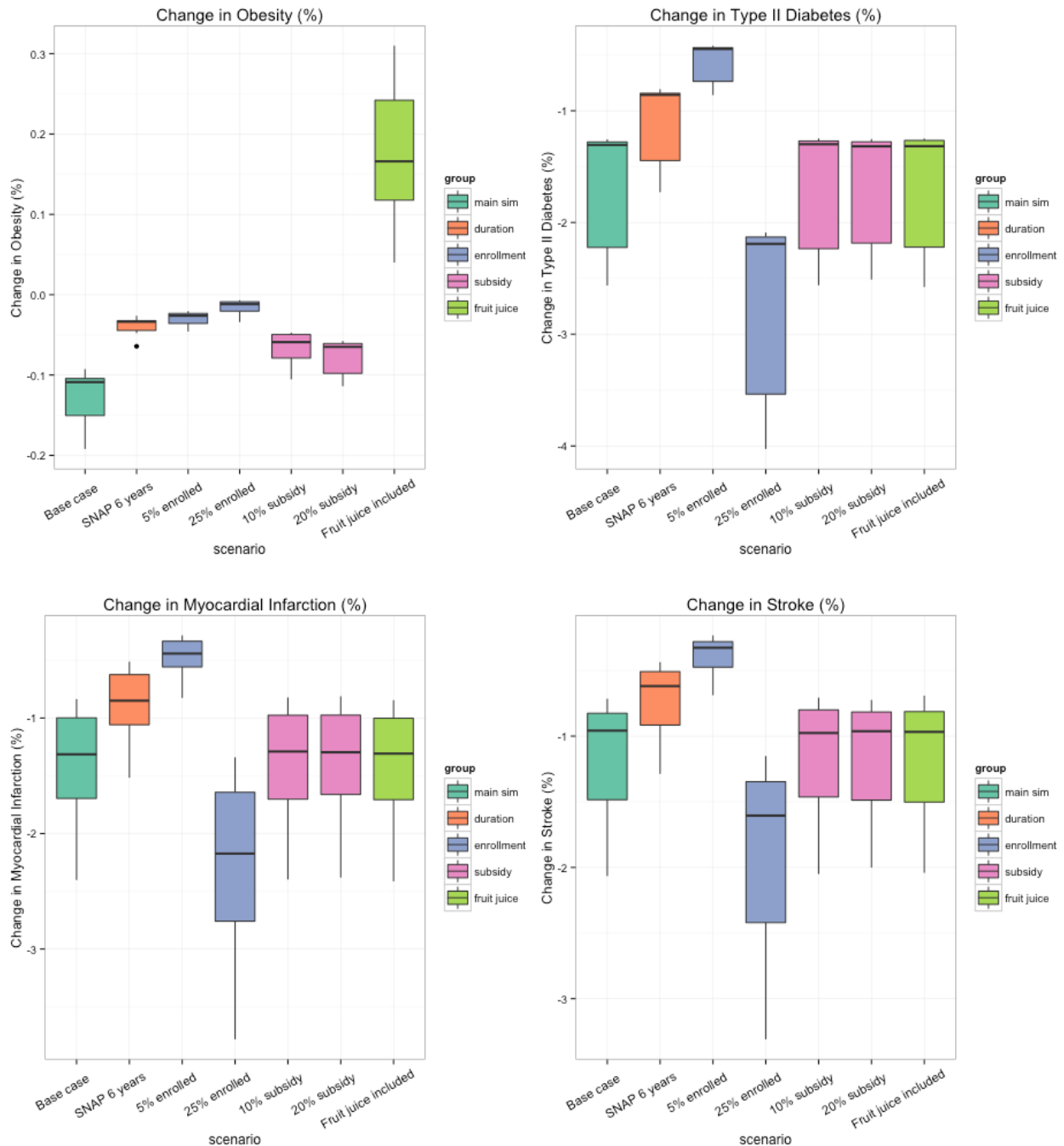
(C) QALYs gained after subsidy



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Appendix Figure 6. Sensitivity analyses: Projected reduction in incidence of diseases under various scenarios.

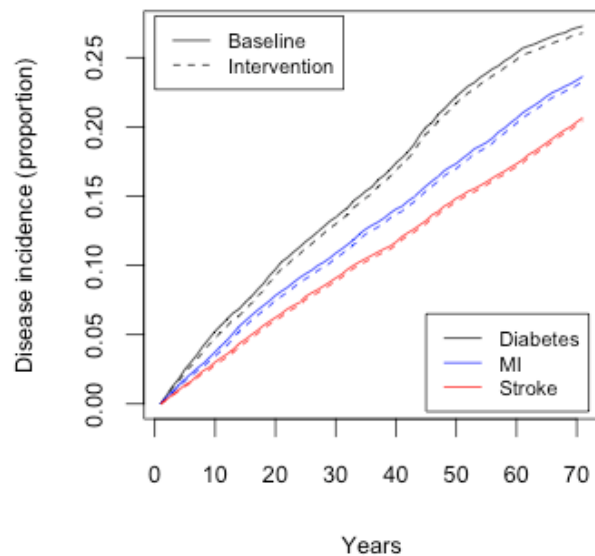
Notes: The box plots reflect probabilistic uncertainty analysis in which we repeatedly sampled from the probability distributions of input data to provide a sense of the range of outcomes in results.



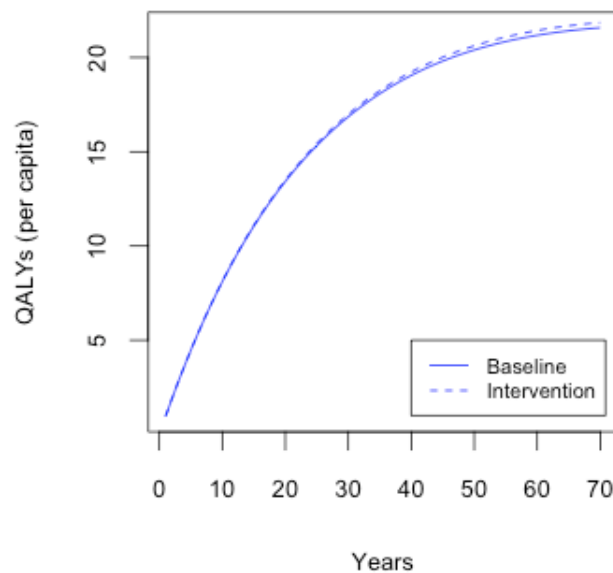
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Appendix Figure 7. Outcomes over years of simulation.

Disease incidence by time



QALYs experienced per capita by time



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Appendix Table 1. Projected Estimates of Lifetime Risk of Health Outcomes, % (SE), and Incidence Reduction From the Status Quo, % (SE)

Scenario	Incidence of obesity		Incidence of Type II diabetes		Incidence of MI		Incidence of stroke	
	Overall pop	SNAP pop	Overall pop	SNAP pop	Overall pop	SNAP pop	Overall pop	SNAP pop
Status quo	26.3 (0.02)	29.2 (0.07)	29.6 (0.02)	30.8 (0.03)	24.6 (0.03)	25.5 (0.07)	20.8 (0.02)	20.6 (0.07)
30% subsidy	26.2 (0.02)	28.9 (0.07)	29.0 (0.02)	27.5(0.03)	24.2 (0.03)	23.3 (0.07)	20.5 (0.02)	19.0 (0.07)
	-0.22 (0.09)	-1.32 (0.32)	-1.70 (0.02)	-10.27 (0.80)	-1.42 (0.09)	-8.54 (0.67)	-1.18 (0.12)	-7.39 (0.56)
By demographic groups								
Gender								
Male	27.1 (0.02)	29.7 (0.07)	23.1 (0.02)	21.8 (0.03)	26.8 (0.03)	26.0 (0.3)	21.8 (0.02)	20.0 (0.03)
	-0.21 (0.09)	-1.24 (0.31)	-1.70 (0.02)	-10.33 (0.80)	-1.66 (0.09)	-9.90 (0.14)	-1.32 (0.12)	-8.32 (0.19)
Female	25.4(0.02)	28.1 (0.07)	34.9 (0.02)	33.3 (0.03)	21.6 (0.03)	20.6 (0.03)	19.2 (0.03)	18.0 (0.03)
	-0.24 (0.10)	-1.42 (0.33)	-1.71 (0.02)	-10.21 (0.80)	-1.17 (0.11)	-7.18 (0.19)	-1.04 (0.14)	-6.46 (0.18)
Race/Ethnicity								
Mexican	27.6 (0.03)	30.6 (0.09)	31.6 (0.02)	30.1 (0.03)	23.5 (0.03)	22.35(0.03)	19.9 (0.02)	18.2 (0.03)
	-0.14 (0.10)	-1.06(0.36)	-1.26 (0.02)	-9.90 (0.80)	-1.02 (0.11)	-8.07 (019)	-0.80 (0.14)	-6.79 (0.47)
NH white	11.7 (0.02)	14.2 (0.06)	18.2 (0.02)	17.6 (0.02)	22.1 (0.02)	21.2 (0.02)	19.3 (0.03)	17.7 (0.02)
	-0.38 (0.16)	-2.36(0.43)	-1.32 (0.02)	-9.25 (0.80)	-1.14 (0.09)	-8.09 (0.15)	-0.91 (0.12)	-6.82 (0.42)
NH black	39.6 (0.03)	41.8 (0.06)	37.3 (0.02)	34.9 (0.03)	26.9 (0.03)	26.3 (0.03)	22.3 (0.03)	21.1 (0.03)
	-0.13 (0.07)	-0.61(0.18)	-2.52(0.02)	-11.67 (0.50)	-2.09 (0.09)	-9.46 (0.13)	-1.83 (0.12)	-8.57 (0.27)

Notes: Overall pop shows results for the overall U.S. population, including SNAP participants, and SNAP pop shows results for the SNAP participants only

MI, myocardial infarction; NH, non-Hispanic; SNAP, Supplemental Nutrition Assistance Program

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Appendix Table 2.

A. Relative Risks (95% CI) for Selected Diseases With Increased FV Consumption by Age Group¹⁶

Disease	Age group (years)							
	0-4	5-14	15-29	30-44	45-59	60-69	70-79	≥80
Ischaemic heart disease	1.00	1.00	0.90 (0.82-0.99)	0.90 (0.82-0.99)	0.90 (0.82-0.99)	0.90 (0.82-0.99)	0.93 (0.85-1.01)	0.95 (0.87-1.03)
Ischaemic stroke	1.00	1.00	0.94 (0.89-0.99)	0.94 (0.89-0.99)	0.94 (0.89-0.99)	0.94 (0.89-0.99)	0.95 (0.91-1.00)	0.97 (0.92-1.02)
Lung cancer	1.00	1.00	0.96 (0.93-0.99)	0.96 (0.93-0.99)	0.96 (0.93-0.99)	0.96 (0.93-0.99)	0.97 (0.91-1.02)	0.98 (0.92-1.03)

Note: Unit of change in risk in change per 80g/day increase in FV. We assumed linear dose-response relationship between the relative risk estimates and the serving. For example, if a person's age is 20, the relative risk estimate of stroke for 80g/day increase in FV intake was 0.9. If that person had 40g/day increase in FV intake, the relative risk estimate was assumed to be 0.95.

FV, fruit and vegetable

B. Relative Risks (95% CI) for Type II Diabetes With Increased Fruit and Vegetable Consumption by 106g/day¹⁷

Food type	Type II Diabetes
Fruit	0.93(0.88-0.99)
Vegetable	0.90(0.80-1.01)

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C. Relative Risks (95% CI) for Selected Diseases With BMI ¹⁸

Health condition		Myocardial infarction	Stroke	Type II diabetes
Overweight (25≤BMI<30)	Men	1.29 (1.18-1.41)	1.23 (1.13-1.34)	2.40 (2.12-2.72)
	Women	1.82 (1.41-2.36)	1.15 (1.00-1.32)	3.92 (3.10-4.97)
Obesity (30≤BMI)	Men	1.72(1.51-1.96)	1.51 (1.33-1.72)	6.74 (5.55-8.19)
	Women	2.69(2.05-3.53)	1.49 (1.27-1.74)	12.41 (9.03-17.06)

Note: Due to absence of a continuous function or finer categorical relative risk estimates from large-scale meta-analytic data on the effects of BMI on disease risks, we incorporated relative risk estimates associated with the three categories of BMI (Normal, Overweight, Obesity).

D. Relative Risks (95% CI) of Type II Diabetes on CVD Incidence,¹⁹ and Overall and CVD Mortality²⁰

Disease	Gender	CVD incidence	Overall mortality	MI mortality	Stroke mortality
Type II diabetes	Men	3.50 (2.70-4.50)	2.00 (1.89-2.12)	1.76 (1.66-1.88)	2.26 (1.70-3.02)
	Women	2.06 (1.81-2.34)	1.57 (1.46-1.68)	1.76 (1.66-1.88)	2.26 (1.70-3.02)

MI, myocardial infarction; CVD, cardiovascular disease

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Appendix Table 3. Food Consumption and Prices

A. Food Groups and Prices (Dollars per 100 grams)²¹

Food group	Mean	SD
Refined grains/potatoes	0.4100	0.02
Vegetables excluding potatoes	0.3105	0.02
100% Fruit juice	0.1921	0.01
Fruit excluding juices	0.4031	0.02

B. Time on SNAP^a

Length and frequency of SNAP participant spells	
Single short to medium-term (1-23 months)	18.8%
Single long term (24+ months)	20.0%
Multiple spell	61.2%

^aSNAP Dynamics²²: SNAP participation (ever participated) was estimated by age, sex, race, and income based on SNAP participation data in NHANES. SNAP participation spells, single vs. multiple spells were randomly assigned to the SNAP participants based on the observed patterns from 2008-2012 reported by USDA.²² It was reported that the median completed spell length was 96 months, and median time off between spells was 16 month, and we assumed these spell length for the multiple spell participants.

Among multiple spell participants, when they are off the SNAP, they were assumed to return to usual food consumption patterns estimated for each demographic cohort.

C. Impact of Changes in FV Intake: 1% Change in Price of the FV is Associated With Changes in Consumption of the Listed Food Group

Food type	Mean	SD
Refined grain	0.3	0.090
Vegetable	-0.996	0.239
100% fruit juice	-0.699	0.264
Fruit	-0.76	0.272

Note: In the base case, it was assumed that once individuals are off SNAP, their FV consumption go back to their baseline consumption levels

FV, fruit and vegetable; SNAP, Supplemental Nutrition Assistance Program

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Appendix Table 4. Quality of Life and Cost for Disease States, Mean (SD)^{23,24}

Disease states	Quality of life	Cost
Acute MI (1-2 days)	0.578	
Post MI	0.944	\$4,648(356) ^a
Stroke	0.697	
Type II diabetes	0.939	\$2,334(166)
Lung cancer	0.610	\$5705 (582)

^aAnnual cost for MI and stroke

Note: For all diseases, once incurred, annual cost per case of disease was assumed to incur for the remaining years of life.

MI, myocardial infarction

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Appendix Table 5. Risk of Type II Diabetes (per 100,000 Person Years) - CDC

Age	Sex	Race	Mean	SD
18 to <45	M	White	240.98	50
18 to <45	M	Black	426.89	50
18 to <45	M	Mexican	382.13	50
18 to <45	F	White	220.33	50
18 to <45	F	Black	390.3	50
18 to <45	F	Mexican	349.38	50
45 to 65	M	White	853.77	120
45 to 65	M	Black	1,512.39	120
45 to 65	M	Mexican	1,353.84	120
45 to 65	F	White	791.8	110
45 to 65	F	Black	1,402.62	110
45 to 65	F	Mexican	1,255.57	110
65 to 79	M	White	786.37	168
65 to 79	M	Black	1,392.99	168
65 to 79	M	Mexican	1,246.96	168
65 to 79	F	White	729.29	154
65 to 79	F	Black	1,291.89	154
65 to 79	F	Mexican	1,156.45	154

CDC, Centers for Disease Control and Prevention

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Appendix Table 6. Risk of Lung Cancer (Annual Incidence Rate) - SEER

Age	Male			Female		
	White	Black	Mexican	White	Black	Mexican
20-29	0.001	0	0	0.001	0	0
30-39	0.002	0.003	0.001	0.003	0.003	0.001
40-49	0.015	0.022	0.006	0.016	0.022	0.006
50-59	0.069	0.115	0.028	0.059	0.115	0.028
60-69	0.204	0.275	0.097	0.165	0.275	0.097
70-79	0.376	0.431	0.22	0.286	0.431	0.22
80<	0.354	0.391	0.259	0.244	0.391	0.259

SEER, SEER, Surveillance, Epidemiology, and End Results

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Appendix Table 7. Baseline MI History Prevalence (%)

Sex	Race	Income	Age					
			20-39	20-39	40-59	40-59	60-85	60-e85
			Mean	SE	Mean	SE	Mean	S
Male	Mexican	Poor	0.00	NA	3.34	2.40	11.06	4.18
		Low	0.00	NA	0.50	0.36	21.07	6.93
		Middle	0.00	NA	2.19	2.16	10.04	4.35
		High	0.00	NA	0.00	NA	4.97	3.56
	NH white	Poor	3.58	1.77	10.97	3.38	22.52	5.29
		Low	0.00	NA	4.73	2.12	24.72	2.98
		Middle	0.37	0.27	1.37	0.83	13.30	2.02
		High	0.00	NA	1.85	0.61	12.15	2.07
	NH black	Poor	0.00	NA	8.83	4.36	9.11	4.05
		Low	0.00	NA	6.18	3.15	12.58	3.57
		Middle	0.25	0.25	5.46	2.74	9.40	2.83
		High	0.00	NA	0.00	NA	2.91	1.82
	Mexican	Poor	0.00	NA	5.10	4.38	7.46	3.11
		Low	0.00	NA	0.00	NA	1.72	0.93
		Middle	0.00	NA	0.70	0.70	4.45	3.09
		High	0.00	NA	0.00	NA	0.00	NA
	NH white	Poor	0.35	0.28	3.36	1.77	17.05	4.06
		Low	0.00	NA	1.82	1.19	11.14	2.00
		Middle	1.02	0.75	1.22	0.63	5.44	1.32
		High	0.00	NA	1.37	0.69	3.97	1.18
	NH black	Poor	0.23	0.24	4.53	2.89	8.78	3.35
		Low	0.00	NA	0.51	0.51	5.71	1.89
		Middle	0.23	0.23	3.42	2.00	3.92	2.03
		High	0.00	NA	2.12	1.49	3.55	2.16

MI, myocardial infarction; NH, non-Hispanic

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Appendix Table 8. Baseline Stroke History Prevalence (%)

Sex	Race	Income	Age					
			20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	0.00	NA	0.47	0.47	7.46	3.56
		Low	0.00	NA	4.46	3.70	11.23	6.31
		Middle	0.00	NA	0.52	0.52	9.13	4.26
		High	0.00	NA	0.93	0.93	14.83	7.93
	NH white	Poor	1.62	1.05	1.39	0.85	12.64	3.79
		Low	0.00	NA	2.60	1.44	10.90	2.04
		Middle	0.37	0.27	1.65	1.05	6.58	1.08
		High	0.00	NA	1.04	0.76	2.77	0.94
	NH black	Poor	0.00	NA	3.56	3.47	21.66	6.02
		Low	0.00	NA	4.85	3.20	13.32	3.28
		Middle	0.37	0.37	3.76	1.87	9.56	2.96
		High	0.00	NA	4.06	2.30	4.09	2.16
Female	Mexican	Poor	0.35	0.35	6.32	3.99	1.73	1.27
		Low	0.00	NA	4.10	2.58	4.97	2.10
		Middle	0.00	NA	0.00	NA	5.09	3.09
		High	0.00	NA	0.00	NA	5.22	3.46
	NH white	Poor	1.80	1.54	6.78	2.92	17.41	4.03
		Low	0.11	0.11	5.50	1.94	12.21	2.23
		Middle	0.81	0.68	2.43	1.00	7.73	1.60
		High	0.99	0.76	0.60	0.40	6.10	1.59
	NH black	Poor	1.25	0.99	12.35	4.42	7.98	3.17
		Low	0.29	0.29	2.85	1.81	11.28	3.18
		Middle	0.00	NA	4.73	2.33	13.06	4.21
		High	0.00	NA	2.03	1.45	5.78	3.32

NH, non-Hispanic

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Appendix Table 9. Baseline Hypertension Medication Use Prevalence (%)

Sex	Race	Income	Age							
			10-19	10-19	20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	0.00	NA	1.68	1.43	15.88	4.99	36.67	7.08
		Low	1.14	1.14	1.02	1.02	14.80	5.23	40.53	7.21
		Middle	0.00	NA	1.01	1.02	13.89	4.29	43.50	7.01
		High	0.00	NA	0.96	0.98	8.40	2.90	47.71	11.59
	NH white	Poor	2.65	2.62	7.61	2.88	24.84	4.40	45.15	6.08
		Low	0.00	NA	1.31	0.62	24.28	4.27	49.43	3.29
		Middle	0.00	NA	2.26	1.23	22.31	3.32	54.49	2.97
		High	1.87	1.85	3.45	1.05	17.13	2.05	47.75	3.23
	NH black	Poor	0.00	NA	2.73	1.81	26.60	6.72	64.64	7.31
		Low	0.00	NA	3.28	2.34	32.76	6.28	63.26	5.22
		Middle	2.14	2.12	6.27	2.05	27.99	5.08	55.12	5.11
		High	0.00	NA	7.47	3.62	27.45	4.60	57.03	6.99
	Mexican	Poor	0.00	NA	1.00	0.99	12.77	4.49	41.33	5.91
		Low	0.00	NA	0.16	0.16	6.23	2.03	52.15	6.51
		Middle	0.00	NA	3.16	2.69	15.31	4.91	48.62	6.96
		High	0.00	NA	5.80	5.58	23.08	7.39	38.01	10.24
	NH white	Poor	0.00	NA	4.61	2.44	20.57	4.33	55.03	5.64
		Low	0.00	NA	3.05	1.95	21.76	4.18	55.18	3.05
		Middle	1.62	1.61	2.49	1.09	22.20	3.17	47.22	2.93
		High	0.00	NA	1.60	1.06	22.56	2.48	45.28	3.66
	NH black	Poor	0.21	0.21	7.71	2.52	45.22	6.63	68.64	5.93
		Low	4.68	4.51	7.14	2.57	38.41	5.37	78.54	3.95
		Middle	1.13	1.14	3.89	1.64	33.87	4.80	71.84	5.24
		High	0.00	NA	3.09	2.26	34.92	5.03	70.28	6.39

NH, non-Hispanic

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Appendix Table 10. Baseline Systolic Blood Pressure (mmHg)

Sex	Race	Income	0-9	0-9	10-19	10-19	20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	100.84	1.37	110.71	0.92	118.30	1.11	123.40	2.12	134.19	2.86
		Low	102.64	1.38	111.46	0.85	119.00	1.15	124.70	1.85	137.27	2.49
		Middle	99.03	2.04	110.88	1.31	118.31	2.09	122.10	1.88	138.84	4.24
		High	91.33	3.03	110.80	1.48	124.63	2.43	120.85	2.76	129.28	4.24
	NH white	Poor	100.80	2.33	109.97	1.12	118.09	1.18	124.72	1.91	133.76	2.33
		Low	99.08	1.20	110.69	1.18	118.96	0.97	125.91	2.54	133.35	1.37
		Middle	102.30	1.45	111.24	0.83	119.09	0.95	124.94	0.95	132.37	1.11
		High	104.57	2.30	109.81	0.88	119.70	0.79	123.15	0.83	130.86	1.26
	NH black	Poor	104.41	2.32	111.62	0.92	120.30	1.35	127.90	2.86	136.77	3.22
		Low	99.35	2.65	111.29	1.27	122.30	1.36	127.61	2.59	140.19	2.36
		Middle	100.51	2.95	113.60	1.53	122.54	1.13	125.52	1.74	138.78	1.83
		High	106.74	2.58	110.80	1.30	121.71	2.26	127.77	1.55	128.54	2.25
	Mexican	Poor	101.74	1.73	106.40	0.71	110.02	1.29	118.52	2.12	144.13	2.54
		Low	100.28	1.81	106.31	0.89	109.18	0.92	122.14	2.82	140.61	2.76
		Middle	99.98	1.57	107.58	1.03	111.20	1.31	126.48	2.78	140.13	3.95
		High	104.28	1.58	102.51	1.25	109.14	2.16	119.71	2.32	130.09	3.46
Female	NH white	Poor	96.17	1.28	108.19	0.89	111.00	1.14	123.19	2.54	139.03	2.47
		Low	101.05	1.34	106.89	0.75	109.37	1.09	124.30	2.20	138.40	1.30
		Middle	101.21	1.82	107.61	0.89	111.13	0.77	119.70	1.31	134.75	1.20
		High	98.66	2.28	106.81	0.79	108.50	0.79	120.47	0.94	132.96	1.34
	NH black	Poor	101.60	1.64	110.02	0.95	112.12	1.24	130.08	3.42	145.17	3.27
		Low	101.63	2.36	109.08	0.91	116.00	1.87	130.73	2.16	140.59	2.90
		Middle	99.03	1.47	105.92	1.16	114.83	1.31	130.29	2.38	137.03	2.16
		High	101.10	2.92	107.08	1.39	113.19	1.53	122.99	2.20	141.44	3.23

NH, non-Hispanic

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Appendix Table 11. Baseline Total Cholesterol (mmol/L)

Sex	Race	Income	Age									
			0-9	0-9	10-19	10-19	20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	160.72	3.56	159.06	2.56	189.96	5.15	206.00	5.86	200.57	6.17
		Low	156.69	3.39	160.77	2.19	197.50	4.10	212.78	5.55	193.72	5.56
		Middle	158.42	3.51	161.76	2.90	197.16	4.78	210.91	7.69	201.40	5.96
		High	168.99	7.69	154.19	4.44	187.50	7.15	218.18	7.68	196.70	6.20
	NH white	Poor	158.05	5.48	159.65	3.59	194.30	9.27	212.35	3.51	205.19	10.41
		Low	168.97	6.37	162.60	3.60	186.76	3.51	206.52	5.38	187.86	2.62
		Middle	161.41	4.29	157.91	2.90	190.87	3.44	205.14	3.40	186.97	2.62
		High	160.01	3.67	159.26	2.44	192.79	2.51	209.52	2.41	190.90	2.48
	NH black	Poor	159.09	3.45	165.67	2.68	178.51	5.71	195.38	6.00	195.73	5.71
		Low	167.11	3.80	159.22	2.79	187.82	4.66	195.53	4.54	190.29	4.67
		Middle	158.82	3.55	155.60	2.81	191.16	4.04	200.05	4.60	189.67	4.20
		High	180.46	8.51	174.08	5.29	192.09	6.67	205.55	4.21	185.79	4.57
Female	Mexican	Poor	159.61	3.19	158.78	2.13	183.26	3.52	194.93	5.49	206.13	4.35
		Low	169.62	4.12	162.09	2.62	187.59	4.19	209.73	5.52	198.37	5.38
		Middle	156.98	4.43	164.38	3.83	187.68	4.63	206.94	5.30	210.26	6.49
		High	167.22	8.72	157.30	4.56	204.54	7.81	214.95	5.87	209.60	5.91
	NH white	Poor	161.69	5.16	165.74	4.28	200.78	7.15	207.99	4.96	214.18	4.36
		Low	164.98	7.19	171.18	3.71	184.12	2.89	216.93	4.73	213.35	2.81
		Middle	163.92	3.44	164.25	2.36	192.80	3.29	208.74	2.99	211.06	2.35
		High	171.95	3.43	163.58	2.45	191.20	2.67	207.89	2.33	212.78	2.83
	NH black	Poor	163.11	3.76	168.79	2.71	184.45	4.19	198.04	5.27	207.82	5.23
		Low	163.59	3.66	169.60	2.96	185.56	4.40	209.39	4.53	211.03	4.52
		Middle	154.79	4.65	153.64	4.17	178.98	3.67	195.18	4.25	202.20	4.32
		High	164.76	3.68	165.40	4.85	189.59	6.35	202.15	3.72	209.66	5.47

NH, non-Hispanic

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Appendix Table 12. Baseline HDL Cholesterol (mmol/L)

Sex	Race	Income	Age									
			0-9	0-9	10-19	10-19	20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	53.27	1.92	48.16	0.96	44.98	1.34	41.82	1.28	45.23	1.60
		Low	51.98	1.76	49.58	1.07	44.18	1.22	45.34	1.83	45.44	1.38
		Middle	55.83	2.05	48.47	1.33	47.82	1.27	48.15	2.83	46.83	2.22
		High	58.73	7.36	46.92	2.19	44.69	2.52	49.00	2.53	49.04	2.67
	NH white	Poor	49.97	2.13	47.41	1.24	45.23	1.37	44.61	1.37	49.01	2.34
		Low	56.52	1.72	50.36	1.63	46.14	1.13	43.81	1.78	47.82	0.92
		Middle	51.92	1.21	48.01	0.90	45.40	1.01	47.08	1.00	48.55	0.73
		High	51.53	1.72	50.15	1.00	48.24	0.88	47.48	0.71	48.37	0.76
	NH black	Poor	59.70	1.55	56.00	1.14	51.18	1.88	56.75	4.12	56.23	2.68
		Low	59.75	1.56	53.03	1.21	48.20	1.90	51.97	2.17	53.81	1.62
		Middle	62.63	2.81	55.48	0.94	52.02	1.45	52.06	1.97	52.68	1.57
		High	63.44	4.27	57.31	2.05	50.62	1.95	49.07	1.16	52.01	1.57
Female	Mexican	Poor	51.28	1.29	51.74	0.97	51.70	1.09	51.36	2.89	52.92	1.62
		Low	53.56	1.79	53.58	1.48	56.57	1.45	53.37	1.68	54.82	1.54
		Middle	53.40	3.12	53.44	1.17	54.08	2.32	54.45	1.97	55.12	1.32
		High	51.23	4.91	53.65	1.52	58.30	2.92	62.27	2.79	58.15	2.79
	NH white	Poor	48.87	2.11	51.85	1.30	52.94	1.73	52.52	1.75	61.13	1.80
		Low	55.40	2.13	51.83	1.20	54.31	1.32	58.92	2.02	59.24	1.02
		Middle	54.11	2.30	53.49	1.25	56.97	1.03	58.08	1.16	61.12	1.06
		High	54.31	1.52	55.32	0.91	63.00	1.19	60.95	1.01	62.23	1.25
	NH black	Poor	58.55	1.55	58.45	1.35	57.19	1.58	58.86	2.44	61.06	1.96
		Low	55.79	1.88	56.70	1.46	57.37	1.77	61.27	1.95	70.82	3.89
		Middle	59.46	3.32	54.35	1.65	60.99	1.92	60.11	1.66	60.66	1.76
		High	60.56	2.23	56.87	1.91	60.74	2.00	62.82	1.53	62.84	3.29

HDL, high-density lipoprotein; NH, non-Hispanic

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Appendix Table 13. Baseline Weight (Kg)

Sex	Race	Income	Age									
			0-9	0-9	10-19	10-19	20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	21.42	0.95	62.83	2.00	80.41	2.04	78.88	1.61	79.49	1.92
		Low	20.22	0.74	64.40	2.12	81.85	2.43	79.54	1.44	79.27	1.93
		Middle	22.35	1.23	65.89	2.85	86.38	3.22	87.34	3.10	81.27	2.09
		High	19.19	1.59	67.49	4.38	87.56	2.43	86.89	2.26	85.93	3.20
	NH white	Poor	19.04	0.85	67.34	2.54	86.97	2.81	84.71	1.73	82.69	2.62
		Low	20.52	1.25	64.76	3.02	85.82	1.78	90.93	2.32	85.84	1.32
		Middle	21.72	0.70	64.29	1.86	87.50	1.38	94.16	1.64	88.09	1.18
		High	19.94	0.82	62.89	1.65	87.97	1.21	92.11	0.88	91.46	0.99
	NH black	Poor	20.37	0.89	63.77	1.55	88.09	3.59	84.94	3.06	78.41	2.74
		Low	21.26	0.98	65.20	2.79	93.44	2.58	91.23	3.75	86.55	2.20
		Middle	20.87	0.89	64.11	2.04	92.34	2.39	89.95	2.50	89.98	1.79
		High	22.01	1.80	64.08	3.56	94.37	3.77	94.65	1.64	90.81	2.26
Female	Mexican	Poor	18.24	0.52	55.49	1.19	75.39	1.80	74.92	2.74	71.82	1.56
		Low	19.67	0.80	52.38	1.32	69.67	1.76	71.26	1.54	69.81	1.85
		Middle	20.86	1.04	58.67	2.03	80.47	3.02	77.61	2.43	73.82	2.03
		High	21.12	1.54	55.58	2.30	70.98	3.11	74.10	2.62	70.41	3.75
	NH white	Poor	20.46	1.40	61.50	1.90	75.91	3.50	77.54	2.61	71.17	1.80
		Low	19.45	0.93	58.98	1.79	74.41	1.90	79.00	2.50	72.11	0.94
		Middle	20.49	0.85	57.64	1.15	75.53	1.62	78.10	1.51	72.73	0.93
		High	20.39	0.83	57.22	1.18	68.81	1.02	76.11	1.14	73.20	1.49
	NH black	Poor	20.37	0.80	67.49	2.19	87.25	2.80	87.83	3.44	82.33	2.76
		Low	24.04	1.32	65.39	2.70	90.83	4.53	87.57	2.49	80.97	1.93
		Middle	22.33	0.95	65.17	2.10	79.41	1.99	86.94	2.33	79.58	1.98
		High	21.47	1.62	63.91	2.43	80.83	3.62	83.17	2.03	81.91	2.72

NH, non-Hispanic

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Appendix Table 14. Baseline Height (cm)

Sex	Race	Income	Age									
			0-9	0-9	10-19	10-19	20-39	20-39	40-59	40-59	60-85	60-85
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	Mexican	Poor	114.76	1.48	161.87	1.24	168.64	0.92	167.20	0.90	167.38	1.09
		Low	114.18	1.43	163.31	0.87	168.81	0.79	168.56	0.81	166.47	0.82
		Middle	117.54	1.76	163.79	1.84	172.55	0.96	172.52	0.84	167.22	0.83
		High	113.26	3.05	167.83	1.56	174.71	1.54	172.57	1.24	171.34	1.89
	NH white	Poor	112.73	1.75	167.19	1.62	177.28	0.66	175.66	0.70	172.38	0.81
		Low	116.07	1.63	165.44	2.04	178.41	0.65	177.87	0.71	172.73	0.42
		Middle	119.50	1.26	167.23	0.97	178.64	0.53	178.70	0.53	173.94	0.42
		High	115.25	1.71	166.68	1.18	178.95	0.55	178.07	0.39	176.70	0.43
	NH black	Poor	115.00	1.41	164.71	1.08	178.68	1.00	176.76	1.11	171.54	0.97
		Low	117.76	1.86	164.81	1.31	177.37	1.12	176.48	0.80	173.28	0.80
		Middle	117.70	1.74	167.35	1.32	177.34	0.61	177.42	0.68	174.40	0.68
		High	119.56	3.32	164.17	1.98	178.78	1.14	177.85	0.67	177.84	0.72
Female	Mexican	Poor	111.96	1.16	153.04	0.68	157.24	0.61	157.60	0.94	153.47	0.74
		Low	113.21	1.48	153.19	0.93	157.06	0.57	156.36	0.95	153.81	0.62
		Middle	115.26	1.82	157.39	0.95	159.95	0.63	157.51	0.83	154.63	0.77
		High	115.20	3.27	156.93	0.99	160.44	1.35	158.98	0.88	158.26	1.95
	NH white	Poor	114.37	2.01	160.11	0.98	162.44	0.71	162.64	0.72	158.89	0.70
		Low	113.61	2.16	158.50	0.95	164.80	0.47	163.05	0.71	158.74	0.37
		Middle	116.38	1.63	159.68	0.84	164.95	0.48	163.51	0.49	161.23	0.36
		High	117.01	1.48	160.98	0.61	165.02	0.42	163.59	0.36	162.49	0.47
	NH black	Poor	116.14	1.31	159.70	0.77	163.13	0.70	164.28	0.83	162.82	0.98
		Low	117.87	1.84	159.28	1.07	164.01	0.68	161.96	0.78	160.66	0.70
		Middle	118.64	2.08	160.45	1.07	162.90	0.77	164.28	0.68	161.39	0.74
		High	119.07	3.85	161.77	1.61	163.59	1.11	163.58	0.75	162.12	0.99

NH, non-Hispanic

APPENDIX REFERENCES

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Appendix
Cost Effectiveness of Subsidizing Fruit and Vegetable Purchases
Through the Supplemental Nutrition Assistance Program
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